

NOTEBOOK COMPUTER WITH EXTERNAL MEMBRANE SWITCH SCREEN

Cross-Reference to Related Application

This application is a continuation of application, serial Number 07/612,956, filed 11/12/90, now abandoned, which was a continuation-in-part of application, Serial No. 07/420,047, filed October 11, 1989 for PORTABLE ELECTRONIC SUBJECT ORGANIZING SYSTEM which is now ~~U.S.~~ abandoned. Patent No. _____.

BACKGROUND OF THE INVENTION
Field of the Invention

The present invention relates to a notebook or laptop type computers and, more particularly, to such a computer having a membrane switch array overlayed on a flat panel display which may be positioned on an external surface of the computer for convenient access of the membrane switch array to operate the computer.

2. DESCRIPTION OF THE RELATED ART
Background of the Invention

Record keeping is essential to the operation of any business, and a significant percentage of a business's time and space overhead must usually be dedicated to the recording and continual updating of information related to the various aspects of the operation. Such record keeping is necessary not only for the business entity as a whole, but also for individual components of the company, such as divisions and departments, and also for some individual workers. Where a worker must deal directly with a large number of clients, customers, suppliers, or the like, it is

1 often desirable to maintain a file of the names of contacts,
2 addresses, phone numbers, appointment schedules, records of
3 contacts, expense account details, personal interests and
4 idiosyncrasies of the contacts, and the like.

5 The business supplies industries have provided a number
6 of products for facilitating such client record keeping
7 activities. Such records documentation products include
8 index card files, appointment books, address books, special
9 calendars, and the like. Some such products also include
10 combinations of the functions of these products. One
11 particularly useful product is the Rolodex file (Rolodex
12 Corporation) in which cards containing names, addresses,
13 telephone numbers, and miscellaneous notes are connected to
14 a rotary spindle, usually in alphabetical order according to
3 15 a company's or individual's name. While such a device is
16 very convenient for quickly finding information such as
17 names, addresses, and telephone numbers, it is not well
18 suited for scheduling appointments, tracking contacts, and
19 other time and date functions without time consuming
20 manipulation of the individual file cards. Additionally,
21 such a rotary file is not well suited for portability
22 whereby a salesman in the field, for example, could quickly
23 consult his appointment schedule or set up appointments on-
24 the-spot.

25 There have been some efforts to improve upon these
26 conventional paper based card file type tools by the use of
27 computer technology. Such products are embodied as handheld
28 calculator like devices, laptop type computers, and devices
29 occupying a middle ground therebetween. The calculator type
30 devices generally include very limited display capabilities,

1 ranging between a few tens of characters to a few hundred
2 characters, and very limited memory capacities. The
3 calculator type devices, while convenient in size, are
4 usually limited in capabilities and are probably best suited
5 to specific applications such as telephone directories.

6 The laptop type computers are miniaturized general
7 purpose personal computers. They usually have most of the
8 capabilities of conventional desktop personal computers,
9 including relatively large memory capacities, mass storage
10 devices including small floppy disk drives and often hard
11 disk drives, full capability display screens which are
12 usually liquid crystal displays (LCD's), full capability
13 keyboards, and input/output ports for connection to
14 printers, modems and the like. Some include video ports for
15 connection to cathode ray tube (CRT) monitors. One problem
16 with laptops is size and weight, as a result of their
17 complement of capabilities. This makes them cumbersome to
18 carry in the field to occasionally recall a phone number,
19 address, or note. Another problem is complexity of use.
20 While so-called computer literacy is increasing rapidly,
21 there are still considerable numbers of workers who are not
22 acclimated to using computers and are reluctant to attempt
23 to learn to use computers and software therefor.

24 There are midsize electronic card file devices which
25 are larger than the pocket calculator type, but smaller than
26 laptop computers. In general, the midsize devices have
27 larger screens, usually LCD's, and full "qwerty" (typewriter
28 type) keyboards. Generally, they do not have removable
29 mass storage devices, such as floppy disk drives, or I/O
30 ports, and memory capacities are much less than that of

1 laptops. Many such midsize devices have proprietary
2 operating systems and use proprietary software, rather than
3 the generic equivalents usable on laptops.

4 Personal information management (PIM) software has been
5 developed to increase work productivity by allowing
6 information regarding clients, customers, and the like to be
7 entered and quickly recalled. Most such PIM software has
8 general application and allows the user to define the types
9 of information to be entered, such as by the user defining
10 data fields to be entered for each record. Some PIM
11 software provides formats with preset data fields. One
12 problem with existing PIM programs is that their flexibility
13 and power increases their complexity and the time and effort
14 required to learn to set them up and use them. Many such
15 programs do not provide for manipulation of data in a manner
16 which comes naturally, particularly to a nonexperienced
17 computer user. Finally, most conventional PIM software is
18 adapted for use on desktop, portable, and laptop personal
19 computers and is, thus, not highly portable in the field.

20 The size and weight of laptop type computers have been
21 decreasing as further developments have occurred in circuit
22 integration and in increased density and reduced sized mass
23 storage devices. However, the principal data entry and
24 manipulation interface between the user and such computers
25 is a conventional keyboard. Those who cannot type
26 proficiently often find difficulty in deriving meaningful
27 benefits of the capabilities of such computers. Even if the
28 manipulation of data on such a computer is facilitated by
29 software and a transparent membrane switch array overlaid
30 on an LCD screen, such as is disclosed in the aforementioned

B. 1 application, Serial No. 07/420,047, conventional notebook
2 computers are not structured and balanced for convenient use
3 of such improvements. Specifically, conventional
4 "clamshell" type notebook computers, wherein the LCD screen
5 is positioned on the inside surface of a cover panel of the
6 unit, are not well suited to using a membrane switch array
7 over the LCD screen because of the need to hold the cover
8 member with one hand to avoid pivoting the display backward
9 or tipping the unit as a whole backward when making tactile
10 selections on the screen.

11
Cline
12 Summary of the Invention

13
P
14 The present invention provides a portable client
15 tracking system which is particularly well adapted for use
16 by persons who are not experienced computer users for
17 creation of files to track activities with clients,
18 customers, suppliers, and the like. An apparatus for the
19 system includes a small, highly portable case housing a
20 substantially complete personal computer with adaptations
21 for optimum use in the present invention. The invention
22 includes a client tracking program which is similar in some
23 respects to conventional personal information management
24 type programs and provides features particularly adapted for
25 conveniently managing a database of customers, clients or
26 the like and for use with the computer unit of the present
27 invention.

28 The client tracking program is a menu driven flat file
29 type of data base with preset fields for information
30 relating to the identity of personal contacts. In addition,

1 a note field or window allows the entry of any of a
2 plurality of standard notes or free form notes. The note
3 window also includes an indication of the existence and
4 number of voice notes relating to a particular data record.
5 Client records can be searched using entries in data fields,
6 standard notes, or dates as search criteria. Searching can
7 also be done on the basis of multiple criteria related by
8 Boolean logic operators such as AND, AND/OR, and the like.
9 Client records can also be searched on the basis of a range
10 of dates occurring in date related entries in the records.

11 The client tracking program is provided with multiple
12 levels of nested menus for data record activities, such as
13 the creation of data records, the editing of records, update
14 of records, and the like. The program cooperates with the
15 LCD display/membrane switch array on the computer unit in
16 such a manner as to greatly facilitate the use of the system
17 by users with little computer background. Data records are
18 created by entering answers to prompts to thereby fill in
19 the preset data fields. Once the data records have been
20 created, a desired record can be easily recalled or
21 otherwise manipulated by merely touching one of a plurality
22 of displayed menu selections. If desired, and a printer is
23 connected to the computer unit, a record may be printed out
24 in a concise manner for quick reference.

25 The computer unit includes a base housing having
26 therein a central processing unit and support circuitry, as
27 well as a mass storage device such as a small form factor
28 hard disk drive and a conventional keyswitch type keyboard.
29 A cover panel is hingedly connected to the base housing and
30 has an LCD screen with a transparent membrane switch array

1 overlaid on the screen. The computer and the client
2 tracking program, or other software, can be utilized by
3 using either the standard keyboard or by touching regions of
4 the membrane array through which indicia indicating possible
5 selections are displayed. A "soft" keyboard, which may be a
6 replica of the conventional keyboard on the unit, may also
7 be displayed on the screen.

8 In particular, the present invention provides hinge
9 members and electrical connectors which enable the cover
10 panel to be layed flat over the base housing for operation
11 entirely by use of the display/membrane array or,
12 alternatively, for the cover panel to be positioned to allow
13 operation of the unit using the conventional keyboard while
14 viewing the display on the cover panel.

15 In a preferred embodiment of the present invention,
16 separable hinges connect the cover panel to the base
17 housing, and a separable electrical connector assembly
18 provides signal communication between the display and
19 membrane array and the main circuit board within the base
20 housing. The hinges and electrical connector cooperate to
21 allow the cover panel to be separated from the base housing,
22 reversed, and re-attached to allow the cover panel to be
23 closed over the base unit with the display and membrane
24 array facing upward, away from the base housing. The hinges
25 include spring detent members which are aligned along the
26 hinge axis between the base housing and the cover panel.
27 The electrical connector assembly includes a card edge
28 socket pivotally mounted on the hinge axis and connected to
29 the main circuit board by a multiconductor ribbon cable and
30 a matching card edge panel connector extending from the

1 cover panel and received in the socket. The socket has a
2 plurality of pairs of contacts on opposite sides thereof
3 with the sequence of contacts on one side being reversed on
a 4 the opposite side. Similarly, the panel connector ^{has} opposite,
5 reversed pairs of conductive traces which cooperate with the
6 socket contacts to allow the connector to be reversibly
7 received in the socket with full functionality of the unit.

8 In a modified embodiment of the present invention, the
9 cover panel is hingedly connected to the base housing by a
10 pair of compound hinges, each having two pivots, which
11 allows the cover panel and base housing to be mutually
12 pivoted to overlay the cover panel over a lower side of the
13 base housing with the display and membrane array facing
14 outward from the base housing or, alternatively, for the
15 cover panel to be pivoted into a position in which the
16 display generally faces the keyboard for use of the unit in
17 the manner of a conventional notebook type computer.

18 The computer unit according to the present invention
19 retains the standard features of a conventional laptop type
20 computer while providing additional capabilities for a
21 temporary dedicated use of the unit.

22
23 Objects of the Invention

24
25 The principal objects of the present invention are: to
26 provide an improved method and apparatus for tracking client
27 related information; to provide such a method comprising
28 maintaining a database of client data records including
29 preset data fields, standard notes, freeform notes, time and
30 date related notes and voice notes; to provide such a method

1 which provides the capability of recalling records by
2 specifying the name or company of a client, a standard note
3 in the record, or a date related item in a record, either by
4 single search criteria or by combinations of criteria; to
5 provide such a method including the capability of printing
6 out a concise copy of a record; to provide such a method in
7 which the manipulation of records is accomplished
8 principally by the selection of menu items from a system of
9 nested menus; to provide such a method wherein the menu
10 selection items are displayed as menu selection boxes which
11 can be selected by touching the desired selection box; to
12 provide such a method which is simple to learn and intuitive
13 in operation for use by persons with minimal previous
14 computer experience; to provide an apparatus for practicing
15 such a method including a portable computer unit which is
16 operated by a widely used operating system and which is
17 hardware compatible with widely used types of peripherals
18 for economical manufacturing and convenient implementation;
19 to provide such an apparatus including a flat panel display
20 device, such as a liquid crystal display, having a
21 transparent membrane switch array overlayed thereon; to
a 22 provide such an apparatus, ^{which} may include a "soft" keyboard
23 which is displayed on the screen and which is actuated by
24 touching displayed keys to thereby input alphanumeric data;
25 to provide such an apparatus including a mass storage
26 device, such as a small form factor hard disk drive; to
27 provide such an apparatus including a voice digitizer and
28 playback subsystem for the storage and playback of voice
29 notes related to client records; to provide such an
30 apparatus including peripheral ports for the connection of

1 devices such as a printer, a mouse, a conventional keyboard,
2 and the like; to provide such an apparatus which is highly
3 portable and which includes flexible types of portable power
4 supplies including a rechargeable battery pack, an AC power
5 supply, or an adapter for powering the apparatus from an
6 automotive battery system; to provide such an apparatus in
7 the form of a modified notebook type computer; to provide
8 such a computer including a base housing having a main
9 computer board, a conventional keyswitch keyboard, and a
10 hard disk drive mounted therein and a cover panel having a
11 flat panel display with a transparent membrane switch array
12 overlaid thereon; to provide such a computer in which the
13 cover panel is hingedly connected to the base housing and
14 the display/membrane array is connected to the computer main
15 board in such a manner that the cover panel may be folded
16 into covering relation to the base housing with the
17 display/membrane array facing outward or, alternatively, the
18 cover panel may be positioned relative to the base housing
19 whereby the computer may be used in the manner of a
20 conventional notebook computer; to provide a preferred
21 embodiment of such a computer wherein aligned spring detent
22 members form a separable hinge and a separable electrical
23 connector allows the cover panel to be separated from the
24 base housing, reversed, and re-attached to position the
25 cover panel in covering relation to the base housing with
26 the display/membrane array facing outward; to provide an
27 alternative embodiment of such a computer wherein the cover
28 panel is connected to the base housing by compound hinges
29 which allow the cover panel to be pivoted from a closed
30 position of a conventional notebook computer to a position

1 in which the cover panel overlies a lower surface of the
2 base housing with the display/membrane array facing outward;
3 and to provide such an apparatus which is economical to
4 manufacture, convenient and reliable to use, and which is
5 particularly well adapted for its intended purpose.

6 Other objects and advantages of this invention will
7 become apparent from the following description taken in
8 conjunction with the accompanying drawings wherein are set
9 forth, by way of illustration and example, certain
10 embodiments of this invention.

11 The drawings constitute a part of this specification
12 and include exemplary embodiments of the present invention
13 and illustrate various objects and features thereof.

14
15 Brief Description of the Drawings

16
17 Fig. 1 is a perspective view of a one-piece client
18 tracking computer unit with a portion of a transparent
19 membrane switch array broken away to illustrate an LCD
20 screen thereunder.

21 Fig. 2 is a somewhat enlarged, rear elevational view of
22 the one-piece client tracking computer unit and illustrates
23 peripheral connectors of the unit.

24 Fig. 3 is a block diagram of the principal components
25 of the client tracking computer unit.

26 Fig. 4 is a menu flow diagram of a client tracking
27 program forming a client tracking method of the present
28 invention.

29 Fig. 5 is a fragmentary menu flow diagram illustrating
30 several layers of nested menus forming one means of

1 recalling client records.

2 Fig. 6 is a fragmentary menu flow diagram illustrating
3 a submenu for updating information in a client record.

4 Fig. 7 is an exemplary client record created by the
5 client tracking program and illustrates data entries in
6 preset data fields and standard notes and a free form note
7 in a note window.

8 Fig. 8 is a perspective view of a notebook computer
9 unit with an external membrane switch/screen which embodies
10 the present invention and which is illustrated with the
11 membrane switch array and screen positioned externally of
12 the unit, a portion of the array being broken away to
13 illustrate the flat panel display therebelow.

14 Fig. 9 is an enlarged fragmentary side elevational view
15 of the computer unit with portions broken away to illustrate
16 details of a hinged edge card connector arrangement and a
17 flexible ribbon cable connected thereto.

18 Fig. 10 is a perspective view of the computer unit at a
19 reduced scale and illustrates an open position the cover
20 panel having the membrane switch array and flat panel
21 display on an outside surface thereof, an alternative second
22 flat panel display on an inside surface of the cover panel
23 being shown in phantom lines.

24 Fig. 11 is a perspective view similar to Fig. 8 with
25 the cover panel opened for access to a conventional keyboard
26 and reversed so that the membrane switch array and display
27 face a user of the keyboard.

28 Fig. 12 is an enlarged fragmentary perspective view of
29 the computer unit and illustrates details of a separable
30 hinge arrangement and a separable electrical connector

1 assembly of a preferred embodiment of the invention.

13- 2 Fig. 13 is an enlarged fragmentary sectional view taken
3 on line 13-13 of Fig. 8 and illustrates details of spring
4 detent hinge components of the computer unit.

5 Fig. 14 is an enlarged fragmentary side elevational
6 view of the computer unit with the cover panel in an open
7 position and illustrates details of the relationship between
8 the ribbon cable and the computer unit base.

9 Fig. 15 is an enlarged fragmentary perspective view of
10 an alternative embodiment of the computer unit employing a
11 compound hinge mechanism with a cover member thereof shown
12 separated from a computer base of the unit and a ribbon
13 cable connecting between components within the computer base
14 and the cover.

15
16 Detailed Description of the Invention

17
18 As required, detailed embodiments of the present
19 invention are disclosed herein; however, it is to be
20 understood that the disclosed embodiments are merely
21 exemplary of the invention, which may be embodied in
22 various forms. Therefore, specific structural and
23 functional details disclosed herein are not to be
24 interpreted as limiting, but merely as a basis for the
25 claims and as a representative basis for teaching one
26 skilled in the art to variously employ the present
27 invention in virtually any appropriately detailed
28 structure.

29 Referring to the drawings in more detail:

30 The reference numeral 1 generally designates a client

1 tracking computer unit. The computer unit 1 generally
2 includes a portable computer case 2 housing a central
3 processing unit or CPU 3 (Fig. 3), a disk drive 4, a high
4 resolution liquid crystal display (LCD) device 5, and a
5 transparent membrane switch array or transparent membrane
6 switch array or membrane array 6 overlaid on the LCD 5.
7 The CPU 3 executes a client tracking program 7 stored by the
8 disk drive 4 to create and maintain a database of client
9 data records 8. Data for the records 8 is entered by
10 touching the membrane array 6 in the area of keys 9 of a
11 keyboard 10 displayed by the LCD 5. Client record
12 activities related to manipulation of the client records 8
13 are effected by touching the membrane array 6 in the area of
14 menu selections 11 displayed on the LCD 5. The computer
15 unit 1 is provided with a voice digitizer 12 and a speaker
16 13 to enable voice notes to be stored by the disk drive 4
17 and subsequently played back through the speaker 13. Each
18 voice note is linked or associated by the program 7 with a
19 particular client record 8.

20 Referring to Figs. 1, 2 and 3, the illustrated case 2
21 is substantially wedge shaped and is about the size and
22 shape of a thick loose leaf notebook binder. The LCD 5 and
23 membrane array 6 are positioned on a top surface of the case
24 2. The upper surface of the case 2 is provided with
25 convective cooling slots 16 which cooperate with similar
26 openings (not shown) on a lower surface of the case 2 to
27 allow air to flow through the unit 1 to cool the components
28 therein. The case 2 is provided with feet 17 to raise the
29 unit 1 above a surface on which it is placed to facilitate
30 airflow under the unit 1. Microphone openings 18 are

1 provided above a microphone 19 which is connected to the
2 voice digitizer circuitry 12 to admit sound to the
3 microphone 19. The illustrated case 2 has speaker openings
4 20 on the upper surface above the speaker 13 to channel
5 sound therefrom. Alternatively, the speaker 13 may be
6 mounted on a lower wall of the case 2.

7 The case 2 includes a back panel 23 on which are
8 mounted connectors for the connection of external peripheral
9 devices to the computer unit 1. The illustrated unit 1
10 includes a keyboard connector 24 for the connection of an
11 external keyboard 25; a power connector 26 for the
12 connection of an AC power supply 27; a rechargeable battery
13 pack 28, or a twelve volt DC adapter 29 for powering the
14 unit 1 by an automotive; an RS-232 serial port connector 30
15 for the connection of serial interface devices such as a
16 serial mouse 31, a modem (not shown), or a serial printer
17 (not shown); and a Centronics type parallel printer
18 connector 32 for the connection of a parallel printer 33.
19 The back panel 23 is provided with a contrast control 34 for
20 adjusting the contrast of the LCD 5. Additionally, a
21 connector for an external microphone (not shown) and DIN
22 type connector 36 for connection of a bus type mouse 37 to
23 the unit 1 are provided on the back panel 23.

24 Referring particularly to Fig. 3, the CPU 3 includes a
25 microprocessor and support circuitry including RAM, ROM,
26 timing circuitry, bus circuitry, and the like which are
27 typically required to implement a computer and which are
28 conventionally included on a computer motherboard. The
29 illustrated CPU 3 is an IBM-PC/XT (International Business
30 Machines Corporation) compatible computer which uses a

1 version of MS-DOS (Microsoft Disk Operating System,
2 Microsoft Corporation) as an operating system. A
3 motherboard which is particularly well suited for the unit 1
4 is the Little Board/PC, Model 4B, manufactured by Ampro
5 Computers, Inc. The Model 4B uses an NEC V40 microprocessor
6 (NEC Corporation) operating at 7.16 megahertz and which is
7 compatible with the Intel 8088 procesor (Intel Corporation).
8 The Model 4B board has nominal dimensions of 8 inches by
9 5.75 inches by 1 inch and, thus, fits well within the case
10 2. The CPU 3 is provided with 512 kilobytes of RAM.

11 Alternatively, other commercially available motherboards,
12 preferably employing 8088 compatible microprocessors, may be
13 employed for the CPU 3. Also, the circuitry comprising the
14 CPU 3 and other circuitry, as will be detailed below, may be
15 provided on a single computer board with the CPU 3.

16 The unit 1 is provided with a battery backed time-of-
17 day clock/calendar 38 which maintains the time of day and
18 the date for use by the CPU 3 and the software executed
19 thereby. The floppy disk drive 4 is interfaced to the CPU 3
20 and controlled by a floppy disk controller 39. The unit 1
21 may be provided with a hard disk drive 40 in addition to the
22 floppy drive 4. If so, the controller 39 is a combination
23 floppy disk and hard disk controller. The floppy drive 4 is
24 preferably a 3.5 inch, 1.44 megabyte capacity drive which
25 uses standard double sided, high density 3.5 inch floppy
26 disks (not shown separately). This capacity disk provides
27 ample storage capacity for the operating system, the client
28 tracking program 7, and a moderately sized database of
29 client record 8. Operating speed of the unit 1 is enhanced,
30 as is storage capacity, by the provision of a hard disk 40.

1 The hard disk 40 may be any of a number of available 3.5
2 inch hard drives or, preferably, a smaller form factor
3 drive, such as a Prairie Technology Model 220 2.5 inch, 20
4 megabyte hard disk drive. A storage capacity of 20
5 megabytes should be adequate for the unit 1.

6 The LCD display 5 is preferably a high resolution
7 display, and the illustrated display 5 is a Hitachi model
8 LMG6010XUFR reflective display having a 640 by 480 pixel
9 resolution. Alternatively, the screen 5 may be backlit, as
10 by incorporating an electro-luminescent panel therebehind.
11 The display 5 is interfaced to the CPU 3 by a controller or
12 driver 42, such as a Yamaha Display Master model YDM-6420.
13 The membrane switch array 6 is interfaced to the CPU 3 by a
14 membrane switch array controller 43. Although a liquid
15 crystal display is preferred because of its lower power
16 consumption, other types of flat panel technologies may be
17 employed, such as gas plasma displays and the like.
18 Additionally, the unit 1 may be provided with a graphics
19 controller and connector (not shown) for connecting a CRT
20 video monitor (not shown) to the unit 1.

21 The membrane array 6 and controller 43 may be any
22 suitable combination which is compatible in size and shape
23 to the particular LCD 5 and which is compatible with the CPU
24 3. A suitable combination is an Elographics Duratouch model
25 membrane array with an Elographics model E271-140 membrane
26 switch array controller. The membrane array 6 is
27 essentially a high resolution two dimensional array of touch
28 switches and is also sold under the trademark Touchscreen
29 (Dorman-Bogdonoff Corp.). The controller 43 cooperates with
30 the membrane array 6 to locate the coordinates of an area

1 tactilely engaged or touched, the coordinates being
2 communicated to a software driver executed by the CPU 3.
3 When the soft keyboard 10 is active, touching one of the
4 displayed keys 9 causes an ASCII code to be generated which
5 corresponds with the character displayed on the key 9. The
6 membrane array 6 is overlaid on the LCD 5, and a calibration
7 is undertaken to assure that the coordinates of an area
8 touched on the membrane array 6 correspond to the
9 coordinates of an underlying area of the LCD 5.

10 The unit 1 may be provided with a bus mouse port or
11 interface 45 for interfacing the bus mouse 37 to the CPU 3
12 via the connector 36. Alternatively, the serial mouse 31
13 may be interfaced to the CPU 3 through a serial port 46 via
14 the serial connector 30. There are a number of suitable
15 mice of each type which are available, and the selection of
3 16 one would depend primarily on the user's preferences. The
17 unit 1 does not really require a mouse 31 or 37 for
18 convenient pointing and selection to operate the client
19 tracking program 7. The ability to make a selection by
20 touching a displayed menu item by the cooperation between
21 the display 5 and membrane array 6 is even more direct and
22 intuitive than the use of a mouse. However, some users may
23 prefer using a mouse, particularly if the unit 1 is provided
24 with an external video monitor. The serial port 46,
25 although shown separately in Fig. 3, may be incorporated
26 within the CPU 3. Similarly, a parallel port 47, for
27 connection of the printer 33 to the unit 1 via the parallel
28 connector 32, may also be embedded within the CPU 3.

29 The voice digitizer 12 allows the entry of vocal notes
30 for linking to a particular client record 8 and subsequent

1 replay through the speaker 13. A suitable voice digitizer
2 12 is the Covox Voice Master Key System, model PCKS-PO-200.
3 The speaker 13 is interfaced to the digitizer circuit 12 for
4 playback of voice notes. The amount of storage capacity
5 required for a voice note is proportional to the time length
6 of the voice note. Thus, on a unit 1 employing only a
7 floppy disk 4, the number and length of voice notes should
8 be limited and deleted when not needed to avoid filling the
9 disks. A unit 1 employing a hard disk 4 is less limited in
10 the number and length of voice notes which can be recorded
11 and kept.

14 12 Figs. 4-7 illustrate diagrammatically the function of
13 portions of the client tracking program 7, at least as it is
14 presented to and affects the user. Fig. 4 illustrates the
15 top menu selections of a followup or search menu 50, a
16 client menu 51, and a utility menu 52. The selection of any
17 of these main menus brings up sub-menu selections,
18 illustrated below the main selections 50-52. Under the
19 followup menu 50 are search criteria selections including
20 current date 55, optional date 56, standard note 57, and
21 multiple search criteria 58. Under the client menu 51 are
22 selections for name list 60, company list 61, add client 62,
23 deactivate client 63, and reactivate client 64. Under the
24 utility menu 52 are print options 66, note update 67, set
25 date/clock 68, backup data 69, and exit program 70.

26 Fig. 7 illustrates an exemplary client data record 8
27 including a fixed preset window 75 at the top and a
28 scrollable note window 76 at the bottom. The preset window
29 75 is provided with preset data fields 77 corresponding to
30 preset data field identifiers 78. The illustrated

1 identifiers 78 include company, contact, phone number, and
2 the like. The preset data fields 77 include data entries
3 79, such as ABC, Inc.; John Doe, Buyer; an area code and
4 phone number; and the like. The preset window 75 includes a
5 previous call field 80, a current call field 81, and a call
6 update selection 82.

7 The note window 76 is provided for the entry of various
8 notes regarding the client identified in a client record 8
9 and provides note counters, including a standard note
10 counter 85, a keyboard note counter 86, and a voice note
11 counter 87. The note window 76 displays a limited number of
12 notes; however, a much larger number of notes may be
13 contained in a client record 8. A view-up selector 88 and a
14 view-down selector 89 are provided for scrolling or paging a
15 group of notes through the note window 76.

16 The program 7 provides the capability of using a
17 variety of types of notes for entry into the note window 76
18 of client records 8 and which are broadly defined as
19 standard notes and keyboard notes. Standard notes, as
20 defined in the present invention, may consist entirely of a
21 word or group of words and may also include such a word or
22 words combined with a data field. Keyboard notes, on the
23 other hand, are freeform in nature. The program 7 is
24 provided with a set of predefined standard notes which
25 relate generally to dealing with persons involved in
26 commercial environments and situations. For example,
27 standard notes may include areas of general interest to
28 customers about which a salesman may converse with clients,
29 such as "fisherman", "golfer", "health conscious", etc. or
30 personal idiosyncrasies of the client, such as "non-smoker",

1 non-drinker", or the like which the salesman wishes be aware
2 of to avoid possibly losing a sale by unintentionally
3 encroaching upon. The predefined standard notes may also
4 include ones with data fields which receive further
5 information, such as "appointment:", "deadline:", or the
6 like which can receive date related information.

7 The program 7 also provides users with the capability
8 of defining their own standard notes. Referring to Fig. 6,
9 selecting note update 67 under the utility menu 52 causes a
10 sub-menu to be displayed to allow the user to select the
11 type of note to be created and includes selections for tag
12 note 92, date/time 93, short text 94, and long text 95. An
13 additional selection, designated edit note 96, is provided
14 which allows the user to edit a previously created note. As
15 defined in the present invention, a tag note is a
16 descriptive note without a data field which is more specific
17 than those provided in the predefined notes provided with
18 the program, such as "never returns calls", "prompt payer",
19 and the like. A date/time note is a date or time related
20 note with a data field to be filled in with appropriate
21 information, such as "delivery date:", "leaves office at:",
22 and the like. Short text and long text notes are similar
23 except for the space provided in their data fields.
24 Selecting either short text 94 or long text 95 allows the
25 user to name the note which when selected allows the user to
26 fill in appropriate information. For example, a short text
27 note might be "college:" whereas a long text note might be
28 "order numbers:".

29 A client record 8 is initially created by selecting the
30 add client menu 62 under the client menu 51 which causes the

1 program 7 to query the user for data to enter into the
2 preset fields 77 with a series of prompts containing the
3 preset field identifiers 78. The program 7 initially fills
4 both of the call fields 80 and 81 with the current date and
5 time. When a particular record 8 is later recalled, the
6 call update 82 may be selected to cause the newly current
7 date and time to be entered into the current call field 81.
8 Thereafter, the date and time in the current call field 81
9 is cycled up to the previous call field 80 each time the
10 call update box 82 is selected, and the newly current date
11 and time are entered in the current call field 81.

12 In menus and sub-menus of the program 7 which require
13 the entry of information, "accept" and "cancel" selections
14 are provided to allow the user to accept the data entered,
15 or to cancel the modification. When a client record 8 is
16 being displayed, selection of "accept" causes the record 8
17 to be stored on the disk 4 or 40 in its modified condition
18 to replace the record as it existed before the modification.
19 Referring to Fig. 5, a client record 8 may be displayed by
20 selecting either name list 60 or company list 61. When such
21 a selection is made, a list of the alphabet is displayed.
22 The first letter of the contact name is selected if name
23 list 60 was previously selected or the first letter of the
24 company if company list 61 was previously selected. This
25 causes a scrollable partial listing of all names or
26 companies having the selected first letter. From this list,
27 the desired client record 8 may be selected.

28 When the selected client record 8 is displayed, an
29 "edit client" selection 100, an "add new note" selection
30 101, a reschedule selection 102, and a "delete note"

1 selection 103 are also displayed. The edit client selection
2 100 displays the preset data fields 78 for selection to
3 change information therein. The reschedule selection 102
4 displays all date/time related notes in a record 8 for
5 possible modification. The delete note selection 103 causes
6 a scrollable display of all standard notes in a record 8 for
7 selection to be deleted. As illustrated in Fig. 5, the add
8 new note selection 101 causes a menu to displayed which
9 includes a standard note selection 106, a keyboard note
10 selection 107, and a voice note selection 108. Selecting
11 standard note 106 displays all the current standard notes
12 and allows the user select one or more for insertion in the
13 note window 76 of the currently displayed record 8.
14 Selecting keyboard note 107 causes a keyboard note window to
15 displayed for the entry of freeform text which, when
16 accepted, is inserted in the displayed record 8. Keyboard
17 notes in the note window 76 of a record are designated as
18 such and numbered, as illustrated in Fig. 7.

19 The database of active client records 8 is stored on
20 the disk 4 or 40 in an active data file. A client record 8
21 may be deactivated, for any of a number of reasons, by
22 choosing the deactivate client selection 63 under the client
23 menu 51. Such a deactivated client record 8 is removed from
24 the active data file and placed in an inactive data file on
25 the disk 4 or 40. A deactivated record 8 may be
26 subsequently reactivated by selecting "reactivate client" 64
27 which causes a list of inactive client records to be
28 displayed for selection of the record desired to be
29 reactivated.

30 The active client records 8 may be searched according

14 1 to a variety of search criteria by use of the selections 55-
2 58 under the followup menu 50. In general, the search
3 criteria are based on standard notes and date related notes
4 within the note windows 76 of client records 8. For
5 example, a salesman may have previously scheduled several
6 appointments for today, by inserting a date related standard
3 7 note, including today's date, in the appropriate records 8.
8 He may recall all of today's appointments by choosing the
9 current date selection 55. He may then select the listed
10 records for scheduled appointment times. The optional date
11 selection 56 allows the user to search for records having
12 date related notes therein regarding other dates.
13 Additionally, a range of dates may be entered, and all
14 records with date notes falling within the selected range
15 will be listed.

16 Client records 8 may be searched on the basis of any
17 existing standard note by selection the standard note
18 criteria 57. The multiple search criteria 58 allows a
19 search of records using a multiplicity of search criteria.
20 This includes groupings of standard notes as well as date
21 notes. The multiple criteria may be related by Boolean type
22 conditions, such as AND, OR, NOT and the like. The single
23 standard note selection 57 displays a scrollable list of
24 standard notes which, when one is selected, causes the
25 display of a scrollable list of records 8 having the
26 selected standard note therein. Choosing the multiple
27 criteria selection 58 causes the display of a fill-in window
28 with boxes to add or delete standard notes and date range
29 fields. Acceptance of the multiple criteria which have been
30 set up by a user causes a display of a list of records 8

1 having the appropriate combination of notes which have been
2 defined.

3 In the utility menu 52, the print options selection 66
4 displays a window for setting up the type of printout
5 desired and selecting the client records 8 to be printed.
6 The set date/clock selection 68 allows the clock/calender 38
7 to be reset. The clock/calender 38 of the unit 1 is battery
8 backed such that the time and date are normally passed to
9 the program 7 on startup. The backup data selection 69
10 allows the user to duplicate the program 7 and data files
11 therewith on another floppy disk 4 for safekeeping of the
12 records 8. The computer unit 1 is essentially a general
13 purpose personal computer with optimizations for use in the
14 present invention. However, it is capable of running
15 software other than the client tracking program 7. The exit
16 program selection 70 allows the user to exit the program 7
17 for such use.

18 The client tracking program 7 has been described with
19 reference to its use in connection with the computer unit 1.
20 However, with appropriate modifications, the program 7 can
21 be used advantageously on conventional types of desktop,
22 portable, and laptop computers which are hardware and
23 software compatible with the computer unit 1. Additionally,
24 the computer unit 1 has been described as providing for the
25 entry of alphanumeric data using the soft keyboard 10
26 displayed on the LCD 5 or an external keyboard 25.
27 Alternatively, the computer unit 1 may be provided with an
28 integral keyboard with mechanically actuated keyswitches of
29 a conventional type. Preferably, such an integral keyboard
30 would include only the typewriter section of a keyboard with

1 special function keys provided as soft keys employing the
2 display 5 and membrane switch array 6.

14 3 Figs. 8-15 illustrate embodiments of a client tracking
4 computer unit embodied as a notebook type computer. The
5 computer unit 120 generally includes a base housing or base
6 121 and a cover panel or "clamshell" 122 hingedly connected
7 to the base 121. The base 121 includes circuitry similar to
8 that shown in Fig. 3 for the computer unit 1, except that
9 the unit 120 preferably is based on a more advanced
10 microprocessor, such as the 80286 or 80386SX (Intel Corp.).
11 The base 121 has a conventional keyboard 123 including a
12 "qwerty" arrangement of keys 124 mechanically connected to
13 individual keyswitches (not shown). The keyboard 123 is
14 illustrated as being recessed within an upper side 125 of
15 the base 121. The cover panel 122 has a flat panel display
16 device 126, such as a high resolution bit-mapped LCD,
17 mounted thereon with a transparent membrane switch array 127
18 overlayed thereover. The display 126 and membrane array 127
19 cooperate in the same manner as the display 5 and membrane 6
20 of the computer 1.

21 The present invention is particularly directed to a
22 notebook computer unit 120 which has provisions for
23 positioning the cover panel 122 relative to the base housing
24 121 so that the unit 120 can be used in a ^{configuration} ~~configuration~~, as
25 shown in Fig. 8 by viewing the display 126 and making
26 selections, as in the client tracking program 7, by touching
27 the membrane array 127 at displayed areas on the display
28 126. Alternatively, it is desirable to preserve the
29 capability of operating the unit 120 in the manner of a
30 conventional notebook or laptop type computer by configuring

14 1 the unit 120 in the manner illustrated in Fig. 11 by using
2 the standard keyboard 123 in conjunction with viewing the
3 display 126. Figs. 8-14 illustrate a preferred embodiment
4 of the notebook computer unit with an external membrane
5 switch/display screen which accomplishes such objectives.
6 Referring generally to Fig. 12, the computer unit 120
7 includes a separable hinge mechanism 130 and a separable
8 electrical connector assembly 131 which cooperate to allow
9 the cover panel 122 to be completely separated from the base
10 housing 121, reversed, and re-attached to the base housing
11 121 to place the unit 120 in the desired configuration.

12 The base 121 has a plurality of upstanding ears 134,
13 and the cover panel 122 has a plurality of half cylindrical
14 lugs 135 at an inner end of the panel 122. The outer ears
15 134 have spring operated detent pins 136 positioned therein
16 which are aligned to define a hinge axis of the hinge
17 mechanism 130. The detent pins 136 are rounded at their
18 outer ends 137 and have widened heads 138 at the opposite
19 ends. The pins 136 are mounted in counterbored bores 139
20 within the outer ears 134 and are urged inwardly by springs
21 140 acting against outer cover plugs 141. The outer ends
22 137 are sized to be received in detent recesses 142 formed
23 in the outer ends of the lugs 135 of the cover panel 122.
24 The inner ends of the lugs 135 are provided with spring
25 detent pins 143, similar to the pins 136, which are received
26 in detent recesses 144 formed in the outer sides of the
27 inner ears 134. ^{the} ~~The~~ detent pins and recesses on the ears
28 134 and on the lugs 135 are mutually aligned respectively
29 whereby, when the cover panel 122 is attached to the base
30 121, the cover panel 121 is pivotal relative to the base

1 121.

2 The spring constant of the springs 140 and similar
3 springs (not shown) within the lugs 135 is preferably of
4 such a value that the detent pins 137 and 143 exert some
5 frictional force on their respective recesses 136 and 142 to
6 control the position of the cover panel 122 when in an
7 upright position, as in Fig. 11.

8 The separable electrical connector assembly 131
9 includes a card edge socket 150 which is pivotally connected
10 to the inner ears 134 and a card edge connector plate 151
11 which extends from the inner end of the cover panel 122.
12 The socket 150 has a plurality of opposed sets of socket
13 contacts 152 (Fig. 9) extending therealong which are adapted
14 to mate with a plurality of opposed conductive traces 153
15 formed on opposite sides of the card edge plate 151. The
16 opposed sets of socket contacts 152 are connected by a
17 flexible multiconductor ribbon cable 154 to input/output
18 port circuitry (not shown) within the base housing 121 while
19 the traces 153 are connected to the display 126 and the
20 membrane array 127 on the cover panel 122. The sets of
21 socket contacts 152 are resiliently urged inward to engage
22 the sets of traces 153 when the card edge plate 151 is
23 inserted into the card edge socket 150.

24 The socket contacts 152 on opposite sides of the socket
25 150 are arranged in mutually reversed sequence. Similarly,
26 the traces 153 on the opposite sides of the card edge
27 connector plate 151 are arranged in mutually reversed
28 sequence. This provides for correct routing of the signals
29 between the computer components within the base 121 and the
30 display 126 and membrane 127 no matter which way the

1 connector plate 151 is inserted within the socket 150.
2 Thus, the connector assembly 131 is reversible. Similarly,
3 the ears 134 and lugs 135, and the detent members 136 and
4 142-144 arranged symmetrically about a front-to-back
5 centerline of the base housing 121, such that the cover
6 panel 122 is reversible with respect to the base housing
7 121.

8 The cover panel 122 illustrated in Figs. 8, 10, and 11
9 is configured to favor use of the unit 120 in the
10 configuration shown in Fig. 8 in which data and selections
11 are input using the membrane array 127. The illustrated
12 cover panel 122 is provided with latch mechanisms 156 which
13 are usable in a configuration with the display 126 and the
14 membrane array 127 facing away from the base housing 121.
15 However, the unit 120 may alternatively be configured to
16 favor conventional use of the unit 120 (Fig. 11) or to
17 provide equal facility in either configuration. Further,
18 the cover panel 122 may be provided with a second flat panel
19 display 157 on an inner surface with the display 126 and
20 membrane array 127 on the outer surface, and the separable
21 hinge mechanism 130 and separable connector assembly 131
22 dispensed with entirely. This would provide the desired
23 capabilities of the present invention but would result in a
24 more expensive and probably heavier computer unit 120.

25 Fig. 15 illustrates an alternative embodiment of the
26 present invention in which a cover panel 160 of a notebook
27 computer unit 161 is permanently hinged to a base housing
28 162 thereof, but has the capability of providing similar
29 configurations as the computer unit 120. The cover panel
30 160 has a flat panel display device 163 thereon with a

1 transparent membrane switch array 164 overlayed thereon.
2 The cover panel 160 is connected to the base housing 162 by
3 compound hinge assemblies 165. Each compound hinge assembly
4 165 includes a hinge link 166 with a base hinge barrel 167
5 at one end and a cover hinge barrel 168 at the opposite end.
6 Each base barrel 167 is pivotally connected to a pair of
7 spaced apart base knuckles 169 while each cover barrel 168
8 is pivotally connected to a pair of spaced apart cover
9 knuckles 170.

10 The compound hinge links 166 define separate parallel
11 hinge axes, one for the base knuckles 169 and one for the
12 cover knuckles 170. This extends the cover panel 160 away
13 from the base housing 162 so that the cover panel 160 can be
14 pivoted between extreme positions in which the cover panel
15 160 overlies an upper side 173 of the base housing 162 with
16 the display 163 and membrane 164 facing toward the base 162,
17 and an opposite extreme in which the cover panel 160
18 overlies a lower side of the base 162 and the display 163
19 and array 164 face away from the base 162. In the latter
20 configuration, the unit 161 is inverted for use in the same
21 manner as shown in Fig. 8. The display 163 and membrane
22 array 164 are connected to computer circuitry (not shown)
23 within the base housing 162 by a permanently attached,
24 flexible, multiconductor ribbon cable 175.

25 It is to be understood that while certain forms of the
26 present invention have been illustrated and described
27 herein, it is not to be limited to the specific forms or
28 arrangement of parts described and shown.

29
30

Am I Claim: